CLAIMS

1. A method of determining chemical oxygen demand of a water sample, comprising the steps of

a) applying a constant potential bias to a photoelectrochemical cell, having a photoactive working electrode and a counter electrode, and containing a supporting electrolyte solution;

b) illuminating the working electrode with a light source and recording the background photocurrent produced at the working electrode from the supporting electrolyte solution;

c) adding a water sample, to be analysed, to the photoelectrochemical cell;

d) illuminating the working electrode with a light source and recording the total photocurrent produced with the sample;

e) determining the chemical oxygen demand of the water sample according to the type of degradation conditions employed.

2. A method as claimed in claim 1 wherein the photoactive working electrode is a nanoparticulate semiconductive electrode.

3. A method as claimed in claim 2 in which the working electrode is a layer of titanium dioxide nanoparticles coated on an inert conductive substrate.

4. A method as claimed in claim 1 in which a reference electrode is also used in addition to the working and counter electrodes.

5. A method as claimed in claim 1 in which the chemical oxygen demand is determined under exhaustive degradation conditions, in which all organics present in the water sample are oxidised.

6. A method as claimed in claim 1 in which the chemical oxygen demand is determined under non-exhaustive degradation conditions, in which the organics present in the water sample are partially oxidised.

7. A method as claimed in any preceding claim in which the background photocurrent is deducted from the total photocurrent produced with the sample to obtain the photocurrent due to the oxidation of organic material in the sample.

8. A method as claimed in claim in any preceding claim in which the sample is diluted with the supporting electrode.

9. A method as claimed in claim 1 in which the chemical oxygen demand is determined by measuring charge or current under exhaustive degradation conditions with a stationary or flow cell using different operational modes including batch mode, flow-stopped mode and continuous flow mode.

10. A method as claimed in claim 1 in which the chemical oxygen demand is determined by measuring charge or current under non-exhaustive degradation conditions with a stationary or flow cell using different operational modes including batch mode, flow-stopped mode and continuous flow mode.

11. A photoelectrochemical assay apparatus for determining oxygen demand of a water sample which consists of

a) a measuring cell for holding a sample to be analysed

b) a photoactive working electrode and a counter electrode disposed in said cell,

c) a light source adapted to illuminate the photoactive working electrode

d) control means to control the illumination of the working electrode, the applied potential bias, and photocurrent recording

c) photocurrent/charge measuring means to measure the photocurrent/charge at the working electrode

f) analysis means to derive a measure of oxygen demand from the measurements made by the photocurrent/charge measuring means.

12. Apparatus as claimed in claim 11 in which the measuring cell is a flow through cell.

13. Apparatus as claimed in claim 11 or 12 in which a reference electrode is included in the measuring cell.

14. Apparatus as claimed in any one of claims 11 to 13 wherein the photoactive working electrode is a nanoparticulate semiconductive electrode.

15. Apparatus as claimed in any one of claims 11 to 14 in which the working electrode is a layer of titanium dioxide nanoparticles on an inert substrate.

16. Apparatus as claimed in any one of claims 11 to 15 which also includes a reservoir for a supporting electrolyte which is used to measure the background photocurrent and to dilute the sample.

17. Apparatus as claimed in claim 16 which also includes a sample supply/injection system and a supporting electrolyte supply/injection system